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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : C11D

A2

(11) International Publication Number: **WO 00/55286**

(43) International Publication Date: 21 September 2000 (21.09.00)

(21) International Application Number: PCT/GB00/00945

(22) International Filing Date: 17 March 2000 (17.03.00)

(30) Priority Data:

9906215.0	18 March 1999 (18.03.99)	GB
0004124.4	23 February 2000 (23.02.00)	GB

(71)(72) Applicant and Inventor: MULLANE, Mark, Gary [GB/GB]; 10 South View, Portishead, North Somerset BS20 7DP (GB).

(74) Agent: COATES, Ian, Harold; Sommerville & Rushton, 45 Grosvenor Road, St Albans, Hertfordshire AL1 3AW (GB).

(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

Without international search report and to be republished upon receipt of that report.

(54) Title: CLEANING FORMULATION

(57) Abstract

An alkaline, aqueous composition suitable for cleaning carpets and other surfaces, which composition comprises: a) 0.1 to 50 % w/w of a first cleaning agent; b) 0.1 to 20 % w/w of a second cleaning agent; c) 0.1 to 10 % w/w of a third cleaning agent; and d) 0.1 to 10 % w/w of a surfactant and optionally minor amounts of additives, with the balance being made up of water. This formulation is preferably used in conjunction with a neutralising solution. A method for cleaning carpets and other surfaces is also disclosed.

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Cleaning Formulation

The present invention relates to an improved cleaning system. It is particularly applicable to cleaning carpets and upholstery. The invention includes a new method for cleaning; new cleaning apparatus; and new compositions for use in the method and apparatus.

It is important to keep carpets clean. Carpets help purify the environment by accumulating particulates and gases from the feet and footwear of the people who walk over them as well as from the surrounding atmosphere. Soiled carpets, however, are not aesthetically appealing and wear poorly. Left uncleaned, they will eventually release particulates and gases back into the air. In closed-circulation buildings, heavily-soiled carpets will cease to help clean the environment, and may become a source of air pollution that could contribute to health problems.

Carpet-cleaning and maintenance programmes have a direct impact on carpet appearance and performance. Proper cleaning and maintenance can therefore keep carpets looking new and beautiful, extend their lifespan and contribute to a healthier indoor environment. Additionally, modern carpets which have been pre-treated with soil- and stain-retardants require special treatment to clean them properly whilst maintaining their soil- and stain-resistance.

There are a number of known carpet-cleaning and maintenance routines: loose and fitted carpets may be cleaned *in situ* using powder-form products which are scattered onto the carpets and removed again under suction after a mechanical treatment.

So-called 'steam cleaning' is another method offered by many cleaning contractors, but this method tends to saturate the carpet, including the carpet backing, as steam condenses once in contact with the carpet. This and other aqueous treatments tend to leave the fabric being cleaned thoroughly wet. In the case of

carpets or upholstery, this is a major disadvantage. For example, a wet carpet should not be walked on until it is dry, which also means that any furniture cannot be put back into position for many hours.

In addition, if the carpet backing gets wet, it can shrink and this shrinkage can be of an extent to pull a fitted carpet away from the wall, particularly in a large room.

Similar problems exist with other substrates to be cleaned, such as fabrics, which can shrink once they are thoroughly wet.

A widely-used, conventional method involves the application of a detergent solution to the carpet, followed by extraction of detergent plus soils. Detergents, however, only attack water-soluble dirt. Therefore, when water-insoluble materials, such as grease, are present in the carpet, organic solvents must separately be applied and extracted.

Although detergents and other cleaning agents have conventionally been employed as carpet cleaning agents, as currently applied they can be detrimental to carpet appearance. Conventional detergents and cleaning agents used in carpet cleaning are highly alkaline; their pH is generally at least about 10–12. Residues from these alkaline products tend to remain on the carpet after the cleaning process is complete. This is undesirable, because alkaline conditions can affect the colour and stability of some dyes used in carpet and upholstery fabrics. In addition, these alkaline deposits can cause the carpet to become dirtier quicker than would otherwise have been the case.

Such conventional cleaning agents may also contain optical brighteners and soil retardants. The repeated use of these cleaning agents can therefore also lead to build-up of soil retardant and optical brightener in the carpet or on its surface, which, together with alkaline deposits, also promote rapid resoiling and degradation of carpet fibre, particularly in the case of nylon, and also can cause carpet colour to fade due to enhanced UV sensitivity.

Accordingly, it is an object of the present invention to overcome or minimise some or all of the problems outlined above.

According to a first aspect of the present invention, there is therefore provided an alkaline, aqueous composition suitable for cleaning carpets, which composition comprises:

(i) 0.1 to 50% w/w of a first cleaning agent;

(ii) 0.1 to 20% w/w of a second cleaning agent;

(iii) 0.1 to 10% w/w of a third cleaning agent; and

(iv) 0.1 to 10% w/w of a surfactant.

All weights expressed herein are based on the total weight of the total composition, unless stated otherwise.

The composition of the invention is preferably in the form of a finely-balanced solution but may also be a weak emulsion. As well as on carpets, textiles, furnishings and the like, the solution may also be used on other surfaces, such as metal, glass and the like.

The first cleaning agent is water-soluble and is preferably one that is a complexing agent for complexing metal ions, and may also act as an alkaline detergent builder and/or water softener. More preferably, it is a non-acidic cleaning agent.

The second cleaning agent is also water-soluble or miscible and is preferably a binding agent for binding together the other ingredients in the composition and/or for maintaining the other components of the formulation in aqueous solution, emulsion or dispersion and/or otherwise for coupling together the other components of the composition. More preferably, it is miscible with water to form an aqueous solution.

The third cleaning agent is preferably an organic solvent capable of acting as a solubiliser or dissolving agent for grease, fats and the like that, more preferably, is a liquid that is dispersible in the other components of the composition and/or is stable in aqueous conditions.

Therefore, the present invention preferably provides a water-based cleaning composition comprising:-

(a) 0.1 to 50% by weight of detergent builder and water softener;

(b) 0.1 to 20% by weight of coupling agent;

(c) 0.1 to 10% by weight of organic solvent;

(d) 0.1 to 10% surfactant; and, optionally,

(e) minor amounts of additives

the balance being water.

This formulation provides significantly improved grease and stain-removing properties, compared to known formulations. The main ingredients of the formulation having cleaning properties are components (a), (b), (c) and (d), as defined above.

Preferably, the cleaning composition further comprises one or more of the following additional components (additives), including:-

a colouring agent, such as a dye;

a perfume;

a biocide, preservative or anti-septic; and/or

an anti-static agent.

In the compositions of this invention, the conditions for two or more components may be satisfied by one ingredient.

Preferably, in the compositions of this invention, halogenated surfactants and solvents are not used. Halogenated surfactants tend to be expensive and halogenated solvents are not environmentally friendly. The present invention therefore further provides an alternative carpet cleaning formulation that avoids the use of these undesirable ingredients. Similarly, many prior art cleaning compositions incorporate ammonia, or ammonium or other nitrogen-based ingredients; these can also be avoided by using the composition of the present invention. Accordingly, the present

invention further provides a cleaning composition that excludes one or more of: halogenated ingredients and nitrogen-based ingredients.

Preferably, the complexing agent, component (a), comprises one or more solid, water-soluble, inorganic or organic compounds having a pH greater than 7 and preferably such that the pH of the total composition is greater than 8, more preferably in the range of from 8 to 12, especially about 10. Such suitable alkaline compounds may be selected from:-

aminopolycarboxylic acids;

nitrilotriacetic acid;

alkylene diamine derivatives of carboxylic acids, such as ethylene diamine diacetic acid and ethylene diamine tetra-acetic acid (EDTA); and

phosphonates, such as pyrophosphoric acid and polyphosphoric acid;

and salts thereof, such as alkali or alkaline earth metal salts.

These lists are not intended to be limiting in any way and any member of this general class of reagent can be employed. However, preferred compositions of this invention are those that do not include silicates, which (in use) could leave deposits or scale on the surface to be cleaned. The concentration of component (a) is generally in the range of 0.1–50% by weight, with a preferred range of 1-10%w/w. A particularly preferred range is from 2 to 8%w/w.

In a particularly preferred embodiment, the complexing agent, component (a), comprises an inorganic complexing agent comprising one or more of pyrophosphoric acid and polyphosphoric acid; and salts thereof.

Preferably, the binding or coupling agent, component (b), comprises a liquid, water-soluble or miscible, oxygenated organic solvent, such as one or more compounds selected from ethers, alcohols and esters, in particular, an ether of an alkylene glycol.

Suitable compounds for use as component (b) include:-

an ether of ethylene glycol;

an ether of propylene glycol, such as dipropylene glycol monomethyl ether and/or propylene glycol N-butyl ether; and

an aliphatic alcohol, such as a C_1-C_6, preferably C_2-C_4, alkanol, such as *iso*propyl alcohol and/or ethanol.

Especially preferred is when component (b) comprises as dipropylene glycol monomethyl ether and/or propylene glycol N-butyl ether, particularly a mixture thereof, more particularly in a ratio of from about 2-3:1, especially 70:30, respectively.

Typical concentrations for the binding/coupling agent range from 0.1%- 20% by weight with a preferred range being between 1%-10%w/w and a particularly preferred concentration being 3 to 5% by weight.

Preferably, the organic solvent, component (c), is any organic liquid that has particular cleaning effect on grease and fats. It is therefore more preferably immiscible with water in the absence of a surfactant and may comprise a medium-chain hydrocarbon and/or a fatty acid ester. For example, the organic solvent may comprise one or more compounds selected from:-

C_9 to C_{15} linear aliphatic hydrocarbons, such as C_9 to C_{15} low aromatic content kerosene;

C_6 to C_{15} cyclo-aliphatic hydrocarbons;

fatty acid alkyl esters, such as C_{16} to C_{22} fatty acid alkyl esters, preferably, C_{16}-C_{18} fatty acid (C_1-C_4)alkyl esters.

The above list of organic solvents is not intended to be limiting in any way. In principle, it is possible to use any non-toxic, organic solvent for this purpose where the solvent has the ability to dissolve grease and fats. Especially preferred is when component (c) comprises a non-flammable (under the conditions of use), odourless, water-stable medium-chain organic compound, such as a fatty acid derivative, an

alkanol *eg isopropanol*, a glycol or a dibasic ester. Most preferred is a fatty acid methyl ester.

The organic solvent is generally present in a concentration of 0.1–10% by weight with a preferred concentration range being 1% to 5% by weight and a particularly preferred concentration being from 1 to 3%w/w, such as about 2%w/w. More preferably, the amount of solvent is kept to the particularly preferred range for admixture with the lower ranges of surfactant. Higher amounts of the organic solvent will require higher amounts of surfactant, which would lead to the formation of an emulsion, rather than a solution. Such emulsions also form part of this invention but are not preferred over the solutions, in particular because the amount of surfactant required would tend to result in foam.

Preferably, the surfactant, component (d), comprises a liquid, water-soluble or miscible, low-foaming, non-ionic, anionic or amphoteric surfactant, particularly an emulsifying agent that enables the organic solvent, component (c), to mix with the other components of the composition, such as ethers of fatty alcohols *eg* an ethoxylated alcohol. However, there is a very wide range of known surfactants and, in principle, any of these can be employed, as suitable, given the particular formulation. In particular, the surfactant preferably has the ability to bring any soils from the surface to be cleaned into solution or admixture with the composition of the invention.

The surfactant is generally present in a concentration of 0.1–10%w/w with a preferred range being 1–6%w/w and a particularly preferred concentration being in the range of from 3 to 4%w/w, such as about 3.5% by weight. In any case, the amount of surfactant required is, at minimum, that sufficient to maintain component (c), such as a fatty acid methyl ester, in liquid dispersion in the composition.

It is also desirable to add a biocide, which may be selected from any known biocides suitable for the purpose. Typical examples are quaternary ammonium salts, such as benzalkonium chloride. The biocide may be present in an amount in the range

of from 0 to 5%w/w, such as about 1 to 2%w/w. Benzalkonium chloride is also a suitable anti-static agent for use in the composition.

Furthermore, benzalkonium chloride, when present, may comprise the primary contributor to the pH of the solution. Accordingly, the amount of benzalkonium chloride present may be such as to result in a solution having a pH greater than 7 and preferably such that the pH of the total composition is greater than 8, more preferably in the range of from 8 to 12, especially about 10.

It is also preferable to add a dye and/or a perfume to improve the appearance and odour of the cleaning formulation. Such dyes and perfumes for the use in cleaners are well known to those skilled in the art and may be present in an amount in the range of from 0 to 3%w/w, such as about 0.1-0.2%w/w perfume and/or less than about 0.1%w/w, *eg* less than about 0.01%w/w, colouring agent.

In the formulations of the invention, unlike in some prior art formulations, viscosity control is not essential, although the viscosity of the solution tends to be low and of a similar order to that of water or slightly higher. The composition is made up to 100% with water. The amount of water therefore is preferably in the range of from about 60 to 90%w/w, such as in the range of from about 70 to about 80%w/w.

The composition may be presented in ready-to-use form or in the form of a liquid concentrate for dilution with an appropriate amount of water. Conveniently, the composition may be in the form of a liquid concentrate for dilution with, in the range of from, 1 part concentrate to 8 parts water, preferably in the range of from 2 to 6 parts, such as 4 parts water. The weight percentage ranges, at their broadest, expressed above are suitable for both concentrate and final, diluted solution. However, preferred, narrow ranges are generally expressed in terms of a concentrate, for dilution 1 part concentrate with 4 parts water. The pH of the concentrate is in the same range as that mentioned above with respect to the final solution.

Accordingly, the present invention further provides a liquid concentrate for dilution with water to provide an alkaline, aqueous composition suitable for cleaning carpets, which composition is as defined hereinabove.

There is also provided a method for the preparation of a solution or concentrate according to this invention, which method comprises mixing together components (a) to (c), together with the water and any suitable optional ingredients such as biocide, and thereafter adding to that mixture component (d) and any suitable optional ingredients such as orange terpenes.

In order to assist in the objective of reducing or ameliorating build-up of alkali on or in the carpet, an alkaline cleaning composition is preferably used in association with a neutralising composition, whereby the pH of the combined compositions (in use) is reduced to about neutral, as indicated *eg* using a standard litmus paper test. By 'about neutral' in this context is meant that the pH is in the range of from 5.5 to 8.5, but more preferably in the range of from 6.5 to 8, such as about 7.5 or slightly alkaline.

Therefore, according to a second aspect of the invention, there is provided a two-part cleaning composition comprising:

(a) an alkaline cleaning composition, such as preferably a cleaning composition as defined hereinabove; and

(b) a neutralising composition comprising an aqueous solution of a non-oxidising acid.

A wide variety of acids can be used in the neutralising composition, but preferably the non-oxidising acid comprises one or more compounds selected from mild or weak inorganic and organic acids. Preferred such acids are non-toxic, food or pharmaceutical-grade acids, for health and safety reasons. It is particularly preferred to use a non-oxidising, organic acid whose alkali metal or alkaline earth metal salts are water-soluble. Suitable organic acids are therefore citric acid; acetic acid; succinic acid; tartaric acid; tannic acid; propionic acid; and glycolic acid. It is also possible to

use certain inorganic acids, such as sulphamic acid. The pH of the neutralising solution is preferably in the range of from 1.5 to 3.5, such as about 2.

The acid is typically supplied as an aqueous solution of, say, one part by weight of acid in forty parts by weight of water. One part of this stock solution may then be further diluted with, in the range of from, 20 to 80 parts by water before use. That is to say, one litre of stock acid solution is diluted to give a final volume of from 20 to 80 litres. Preferably, the dilution ratio is in the range of from 1:40 to 70, more preferably about 1:60. Once diluted, the pH of the neutralising composition is preferably in the range of from 2.5 to 4.5, more preferably in the range of from about pH 3 to 4. For example, the pH of a neutralising composition diluted 1:40 is preferably about 3.

It is known to apply an aqueous dispersion of an alkaline cleaning agent to a carpet and mechanically to buff the carpet to cause dirt to transfer from the carpet to the buffing pad. It has now surprisingly been discovered that it is highly advantageous to soak the buffing pads in hot, neutralising composition immediately prior to buffing.

This improvement provides a number of advantages. First, as mentioned above, the acid in the neutralising composition tends to neutralise the alkaline cleaning composition on the carpet so that the carpet is left at a substantially neutral pH of 5.5–8.5 on completion of the cleaning process. This protects the dyes in the carpet from discolouration, and tends to reduce the rate of re-soiling and the degradation of carpet fibres.

Secondly, the temperature of the buffing pad is maintained, for the time it takes to apply neutralising solution to the carpet, well above ambient. The raised temperature of the buffing pad appears significantly to increase the rate and extent to which dirt is extracted from the carpet, believed to be as a result of enhanced capillary action causing the dirt to wick up the fibres.

Therefore, according to a third aspect of the invention, there is further provided a method suitable for cleaning carpet, upholstery or the like (referred to herein, collectively, as 'carpet'), which method comprises:-

(a) applying to the carpet an alkaline cleaning composition, such as preferably a cleaning composition as defined hereinabove, in an amount sufficient to wet the carpet fibres; and

(b) mechanically buffing the carpet with a pad soaked in a neutralising composition comprising an aqueous solution of a non-oxidising acid in an amount sufficient to substantially neutralise the alkaline cleaning composition remaining on the carpet.

Preferably, the aqueous acidic solution is heated to a temperature in the range of from 50° to 95°C, more preferably in the range of from 70 to 85 °C prior to buffing the carpet, whereby the pad, after immersion in the neutralising composition, is in that temperature range when the buffing starts.

Preferably, the alkaline cleaning composition comprises a water-based cleaning composition as described herein. Preferably, the neutralising solution comprises an aqueous acidic solution as described herein. Accordingly, the method of the invention is most preferably carried out using the two-part cleaning composition of this invention. More preferably, the method is carried out in a manner whereby the ratio of neutralising solution to cleaning composition is greater than one, such as in the range of from 2 to 4:1, *eg* about 10:3, respectively.

Conveniently, doses of about 15 to 25ml, such as about 18 to 22ml, of the neutralising composition are applied, per pad, to the carpet. As a guide, about 10 litres of neutralising composition are required per 100 square metres of carpet.

Preferred pads for use in the method according to this invention are substantially flat, circular pads, comprising generally synthetic fibres sandwiching an

absorbent layer. For example, they may comprise a polyester/rayon mixture that is capable of being in contact over its whole application face with the carpet, when in use.

Because the buffing pads have to be changed frequently, a special heating device has been developed to keep the pads both hot and saturated with acid solution. In its simplest form, this heating device comprises a liquid-tight tank, having a removable lid through which the pads can be inserted and withdrawn. The tank is conveniently heated by way of a thermostatically controlled heating element or the like, so that the temperature may be controlled between set temperature limits, as suggested above. The tank is constructed from any suitable material that is inert to the acid used. Typically, plastics materials or stainless steel can be used.

There are several desirable features that may optionally be incorporated into the tank. Because the pads are normally circular in shape, it is preferable that the lid to the tank and the access port are also circular. This facilitates inserting and removing the pads.

Because the pads may conveniently be kept immersed in the hot acidic solution whilst awaiting use and yet need to be accessible, preferably without having to delve too deeply into the acidic solution as each pad in turn is required, a spring-loaded dispenser, of the type used to store and dispense plates in a canteen, can be incorporated into the tank. This ensures that, however many pads are waiting in the tank, the top pad is always within easy reach. Alternatively, pads may be immersed in the neutralising composition, one-by-one, as required.

The tank is preferably adapted to be mounted on wheels, so that it can follow the buffing machine around the area to be cleaned. However, for convenience of storage, the wheels may be provided on a detachable trolley or wheel-base, separate from the body of the tank.

The following examples are provided for illustration of the invention only and are not intended to be limiting thereof.

Example 1 - Ready-to-Use Cleaning composition

A water-based cleaning composition was prepared by mixing the following ingredients:-

	% of total composition
Tetrapotassium pyrophosphate	2.00
Propylene glycol ether (DOWANOL DPM)	2.95
(C9 to C15) Aliphatic hydrocarbon (kerosene) (EXXOL D80)	1.91
Ethoxylated alcohol	3.308
Benzalkonium chloride (50% solution)	0.092
Dye/Perfume	Q/S
Water	Q/S to 100%

Example 2 - Cleaning Composition Concentrate

An alkaline, aqueous composition suitable for dilution, prior to use, 1 part to 4 parts water, was prepared by mixing the following ingredients:-

	% of total concentrate
Tetrapotassium pyrophosphate	8.00
Dipropylene glycol monomethyl ether	3.50
Propylene glycol N-butyl ether (DOWANOL PMB)	1.50
(C16-C18) Fatty acid methyl ester	1.50
Ethoxylated alcohol (SYNPERONIC 916)	3.29
Benzalkonium chloride (50% solution)	1.536
Dye	0.0008
Terpenes	0.15
Water	80.3492

CLAIMS

1. An alkaline, aqueous composition suitable for cleaning carpets, which composition comprises:

(a) 0.1 to 50% w/w of a first cleaning agent;

(b) 0.1 to 20% w/w of a second cleaning agent;

(c) 0.1 to 10% w/w of a third cleaning agent; and

(d) 0.1 to 10% w/w of a surfactant.

2. A composition according to claim 1, comprising:

(a) 0.1 to 50% by weight of detergent builder;

(b) 0.1 to 20% by weight of coupling agent;

(c) 0.1 to 10% by weight of organic solvent;

(d) 0.1 to 10% surfactant; and, optionally,

(e) minor amounts of additives

the balance being water.

3. A composition according to claim 1 or claim 2, further comprising one or more of the following additives: a colouring agent, such as a dye; a perfume; a biocide; a preservative; an anti-septic; and/or an anti-static agent.

4. A composition according to any preceding claim, comprising benzalkonium chloride.

5. A composition according to any preceding claim, wherein component (a) is selected from phosphonates, such as pyrophosphoric acid and polyphosphoric acid, and salts thereof.

6. A composition according to any preceding claim, wherein component (b) is selected from oxygenated organic solvents, such as an ether of an alkylene glycol.

7. A composition according to any preceding claim, wherein component (c) is selected from organic solvents able to dissolve greases or fats, such as C_9 to C_{15} linear aliphatic hydrocarbons, such as C_9 to C_{15} low aromatic content kerosene; C_6 to C_{15} cyclo-aliphatic hydrocarbons; and fatty acid alkyl esters, such as C_{16} to C_{22} fatty acid alkyl esters, preferably, C_{16}-C_{18} fatty acid (C_1-C_4) alkyl esters.

8. A composition according to any preceding claim, wherein component (d) is selected from low-foaming surfactants capable of keeping component (c) in solution in the composition, such as ethers of fatty alcohols.

9. A composition according to any preceding claim in the form of a solution.

10. A composition according to any preceding claim, which is substantially free from halogenated surfactants and solvents; and/or ammonia; ammonium and other nitrogen-based ingredients; and/or silicates and other depositing inorganics.

11. A composition according to any preceding claim, having a pH in the range of from 8 to 12, such as about 10.

12. A concentrate composition suitable for dilution with, in the range of from, 1 part concentrate to 8 parts water to prepare a composition according to any preceding claim.

13. A two-part cleaning composition suitable for cleaning carpets, which composition comprises:

(a) an alkaline cleaning composition, such as preferably a cleaning composition according to any preceding claim; and

(b) a neutralising composition comprising an aqueous solution of a non-oxidising acid whereby, in use, the pH of the combined compositions (a) and (b) is in the range of from 5.5 to 8.5, such as from 6.5 to 8.

14. A two-part cleaning composition according to claim 13, wherein the neutralising composition (b) is provided as an aqueous solution of, in the range of from, one part acid to sixty parts water, such as a 1:40 solution.

15. A method suitable for cleaning a surface, which method comprises:-

(a) applying to the surface an alkaline cleaning composition, such as a cleaning composition as defined in any of claims 1 to 11, in an amount sufficient to wet the surface, such as carpet fibres; and

(b) mechanically buffing the surface with a pad soaked in a neutralising composition comprising an aqueous solution of a non-oxidising acid in an amount sufficient to substantially neutralise the alkaline cleaning composition remaining on the surface.

16. A method according to claim 15, wherein the aqueous acidic solution is heated to a temperature in the range of from 50° to 95°C, such as in the range of from 70 to 85°C prior to buffing the surface.

17. A method according to claim 15 or claim 16, wherein the alkaline cleaning composition comprises a water-based cleaning composition according to any of claims 1 to 11.

18. A method according to any of claims 15 to 17, using the two-part cleaning composition according to claim 13 or claim 14.

19. A method according to any of claims 15 to 18, carried out in a manner whereby the ratio of neutralising solution to cleaning composition is greater than one, such as in the range of from 2 to 4:1, respectively.

20. The use of a composition according to any of claims 1 to 14, in the preparation of an aqueous solution for cleaning a surface, such as carpet, upholstery, textiles, furnishings, metal and glass.

21. The use of a composition according to any of claims 1 to 11, 13 or 14 in a method according to any of claims 15 to 19.

22. A method of preparing a composition according to any of claims 1 to 14, which method comprises bringing the components into intimate physical admixture, whereby an aqueous solution or weak emulsion is formed.

23. A composition, method or use, substantially as hereinbefore described with particular reference to the Examples.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 September 2000 (21.09.2000)

PCT

(10) International Publication Number
WO 00/55286 A3

(51) International Patent Classification[7]: C11D 17/00, 3/06, 3/43

(21) International Application Number: PCT/GB00/00945

(22) International Filing Date: 17 March 2000 (17.03.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9906215.0 18 March 1999 (18.03.1999) GB
0004124.4 23 February 2000 (23.02.2000) GB

(71) Applicant and
(72) Inventor: MULLANE, Mark, Gary [GB/GB]; 10 South View, Portishead, North Somerset BS20 7DP (GB).

(74) Agent: COATES, Ian, Harold; Sommerville & Rushton, 45 Grosvenor Road, St Albans, Hertfordshire AL1 3AW (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

(88) Date of publication of the international search report:
28 December 2000

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 00/55286 A3

(54) Title: CLEANING FORMULATION

(57) Abstract: An alkaline, aqueous composition suitable for cleaning carpets and other surfaces, which composition comprises: a) 0.1 to 50 % w/w of a first cleaning agent; b) 0.1 to 20 % w/w of a second cleaning agent; c) 0.1 to 10 % w/w of a third cleaning agent; and d) 0.1 to 10 % w/w of a surfactant and optionally minor amounts of additives, with the balance being made up of water. This formulation is preferably used in conjunction with a neutralising solution. A method for cleaning carpets and other surfaces is also disclosed.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/00945

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C11D17/00 C11D3/06 C11D3/43

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
WPI Data, EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 86 04349 A (STALEY MFG CO A E) 31 July 1986 (1986-07-31) claims 1-4 page 2, line 24 -page 3, line 11 page 10, line 22 - line 29	1-3,5,6, 9,10,17, 20
X	DE 40 39 348 A (HENKEL KGAA) 11 June 1992 (1992-06-11) claim 3	1,2
X	US 4 257 908 A (WIXON HAROLD E) 24 March 1981 (1981-03-24) abstract; examples	1,2,5
A	US 5 192 461 A (CRAIN JAMES R ET AL) 9 March 1993 (1993-03-09) abstract	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 August 2000	06. 10. 2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	SEIRAFI

Form PCT/ISA/210 (second sheet) (July 1992)

ANHANG

Zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr.

ANNEX

To the International Search Report to the international Patent Application No.

ANNEXE

Au rapport de recherche international relativ à la demande de brevet international n°

PCT/GB 00/00945 SAE 281140

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben. Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

This annex lists the patent family members relating to the patent documents cited in the above-mentioned search report. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

La presénte annexe indique les membres de la famille de brevets relatifs aux documents de brevets cités dans le rapport de recherche international visée ci-dessus. Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsibilité de l' Office.

Im Recherchenbericht angeführte Patentdokumente Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
WO A1 8604349	31-07-1986	CA A1 1278971	15-01-1991
		DE C0 3665734	26-10-1989
		EP A1 210220	04-02-1987
		EP B1 210220	20-09-1989
		JP T2 62501570	25-06-1987
		US A 4627931	09-12-1986
DE A1 4039348	11-06-1992	AT E 144549	15-11-1996
		CA AA 2098197	10-06-1992
		DE C0 59108308	28-11-1996
		DK T3 561842	24-03-1997
		EP A1 561842	29-09-1993
		EP B1 561842	23-10-1996
		ES T3 2094829	01-02-1997
		FI A 932601	07-06-1993
		FI A0 932601	07-06-1993
		GR T3 3021680	28-02-1997
		JP T2 6503371	14-04-1994
		NO A 931661	06-05-1993
		NO A0 931661	06-05-1993
		NO B1 302374	23-02-1998
		US A 5429684	04-07-1995
		WO A1 9210558	25-06-1992
US A 4257908	24-03-1981	AU A1 16269/76	02-02-1978
		AU B2 509049	17-04-1980
		CA A1 1070590	29-01-1980
US A 5192461	09-03-1993	none	

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
PA 3650 PCT/INT		

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/00945	17/03/2000	18/03/1999

International Patent Classification (IPC) or national classification and IPC
C11D17/00

Applicant
MULLANE, Mark Gary

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
16/10/2000	11.05.2001

Name and mailing address of the international preliminary examining authority:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Culmann, J-C

Telephone No. +49 89 2399 8487

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00945

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-13 as originally filed

Claims, No.:

1-23 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	4,11,13-19,21
	No:	Claims	1-3,5-10,12,20,22,23
Inventive step (IS)	Yes:	Claims	13-19,21
	No:	Claims	4,11
Industrial applicability (IA)	Yes:	Claims	1-23
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Nota Bene

The Applicant will presumably submit observations and/or new claims upon entry into the regional phase.

In the latter event, since his invention encompasses various embodiments, and since the compositions claimed in claims 1 to 12 do not meet the requirements of the PCT, the question of unity of invention might arise under any regional counterpart of Rule 13.1 PCT.

In order to anticipate any possible problem bound therewith, the Applicant should identify the features which are common to all the embodiments of the invention which will then be claimed and which on their own or in combination represent a contribution over the prior art.

That would be helpful and could expedite the further processing of the present application.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability

1. Document D1 (WO 86/04349) describes compositions (see Examples 1 to 6) which all comprise:

- 0.5 to 2.0% by weight of a glycoside surfactant;
- 2.5% by weight of EDTA;
- 5.0% by weight ethylene glycol monobutyl ether;
- rest water.

These examples anticipate the subject-matter of claims 1, 5, 6, 7, 8, 9, 10, and 23.

[The term "suitable for cleaning carpets" cannot be seen as disqualifying these

compositions of D1, since these compositions comprise all the features identified by the Applicant which are necessary to clean carpets; see also the PCT Guidelines, Chapter III, 4.8.]

Moreover, these compositions of the art, which are suitable for cleaning carpets (because of their essential components which are also those said to be essential in the present application) can further comprise hydrotropes, perfumes and biocides (see D1 on page 12, lines 26 and 30; on page 13, line 1); thus, the subject-matter of claims 2, 3, 4 lacks an inventive step; as the subject-matter of claim 11 (setting the pH is not a problem for the man skilled in the art, and the values specified therein do not lead to any proven unexpected effect).

2. Document D2 (DE-A-40 39 348) discloses concentrated carpet cleaning compositions and diluted carpet cleaning compositions (see more particularly Example 3, the diluted composition M2) which anticipate the subject-matter of claims 1, 3, 6, 7, 8, 9, 10. The pH of the concentrates is set between 4 and 12.

3. Document D3 (US-A-5 192 461) discloses cleaning compositions which are alkaline and comprise (see the examples):

- 8 to 14% of pyrophosphate;
- 2.5% of ethoxylated nonylphenol;
- 12.5% of hydrotrope (the mixture of polyphosphoric acid ester with polyethylene glycol decyl ether and the phosphate ester potassium salt);
- 0.5 to 1% of surfactant (of the APG type)
- other additives;
- rest water.

These compositions of the prior art anticipate the subject-matter of claims 1, 2, 5, 6, 7, 8, 9, 10, 12, 20, 22, and 23.

4. None of the documents cited in the search report relates with a two-part cleaning

composition. None of them relates also to a method of cleaning carpets wherein a first alkaline composition is subsequently neutralized. None of them relates also to the use of a composition according to claims 1 to 11, 13 or 14, in a method according to claims 15 to 19.

Thus, the subject-matter of claims 13 to 19 and 21 is not only novel, but also inventive in the sense that it may not be derived from the documents cited in the search report.

5. The Applicant refrained, though respectfully invited to do so, from restricting the scope of his application to the composition claimed in claim 13, or to the method claimed in claim 15.

VII. Certain defects in the international application.

The requirements of Rule 5.1 a) ii) PCT are not met, the documents D1 to D3 are not identified in the description and the relevant background art disclosed therein is not briefly discussed.

VIII. Certain observations on the international application.

Claims 1 and 2 are definitely unclear; the components of the claimed compositions are identified by the properties that the Applicant assigns to them (it may be noted that water itself may be seen as a "cleaning agent"). Even the terms "builder", "coupling agent", "organic solvent" are too vague, they refer to a possible property (possibly among others) of some chemicals.

Claim 3 lacks support from the description (see the description on page 4, line 16, which means that as a biocide, a preservative or an anti-septic may be present; if the Applicant intended something else, it might be preferable during the regional

phase to insert the wording of claim 3 into the description).

In claim 4, it is somewhat puzzling to read that pyrophosphoric acid or polyphosphoric acid may be identified as phosphonates ! By the way, both pyrophosphoric acid or polyphosphoric acid find support from the description; thus, either the term "phosphonate" should have been retained; or the acids.

Claim 10 contradicts claim 1 and/or 2, wherein the composition claimed comprises a solvent. Or the term "substantially free" has no restrictive meaning.

Claim 13 is unclear, because it defines the 2-part cleaning composition in terms of a specific though not described reaction (respective amounts to be used) between its constituents; furthermore, part (a) is not compulsorily but merely "preferably" a composition "according to any preceding claim".

In claim 14, the dilution of one part of acid in 60 parts water lacks support from the description (but not 40 parts).

In claim 15, the method relates to "surfaces", not to carpets; that is not supported by the description. And makes the application prone to an objection based on any "surface" cleaning composition (including hard surface or metal part cleaning compositions).

Claim 23 is superfluous, it retains without any further restriction the subject-matter of the preceding claims.

∴

Although claims 1, 12, 13, 15, 20, 21, and 22 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and clarity, since the plurality of independent claims makes it difficult to determine the matter for which protection is sought, and places an undue burden

on others seeking to establish the extent of the protection.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 10 January 2001 (10.01.01)	
International application No. PCT/GB00/00945	**Applicant's or agent's file reference** PA 3650 PCT/INT
International filing date (day/month/year) 17 March 2000 (17.03.00)	**Priority date** (day/month/year) 18 March 1999 (18.03.99)
Applicant MULLANE, Mark, Gary	

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:

   16 October 2000 (16.10.00)

   [ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Jean-Marc Vivet
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38